Weather Research and Forecasting Innovation Act of 2017

[Public Law 115–25; Approved April 18, 2017]

[As Amended Through P.L. 117–229, Enacted December 16, 2022]

AN ACT To improve the National Oceanic and Atmospheric Administration's weather research through a focused program of investment on affordable and attainable advances in observational, computing, and modeling capabilities to support substantial improvement in weather forecasting and prediction of high impact weather events, to expand commercial opportunities for the provision of weather data, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) [15 U.S.C. 8501 note] SHORT TITLE.—This Act may be cited as the "Weather Research and Forecasting Innovation Act of 2017".

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

SEC. 2. [15 U.S.C. 8501] DEFINITIONS.

In this Act:

(1) SEASONAL.—The term "seasonal" means the time range between 3 months and 2 years.

(2) STATE.—The term "State" means a State, a territory, or possession of the United States, including a Commonwealth, or the District of Columbia.

(3) SUBSEASONAL.—The term "subseasonal" means the time range between 2 weeks and 3 months.

(4) UNDER SECRETARY.—The term "Under Secretary" means the Under Secretary of Commerce for Oceans and Atmosphere.

(5) WEATHER INDUSTRY AND WEATHER ENTERPRISE.—The terms "weather industry" and "weather enterprise" are interchangeable in this Act, and include individuals and organizations from public, private, and academic sectors that contribute to the research, development, and production of weather forecast products, and primary consumers of these weather forecast products.

TITLE I—UNITED STATES WEATHER RESEARCH AND FORECASTING IMPROVEMENT

SEC. 101. [15 U.S.C. 8511] PUBLIC SAFETY PRIORITY.

In conducting research, the Under Secretary shall prioritize improving weather data, modeling, computing, forecasting, and warnings for the protection of life and property and for the enhancement of the national economy.

SEC. 102. [15 U.S.C. 8512] WEATHER RESEARCH AND FORECASTING INNOVATION.

(a) PROGRAM.—The Assistant Administrator for the Office of Oceanic and Atmospheric Research shall conduct a program to develop improved understanding of and forecast capabilities for atmospheric events and their impacts, placing priority on developing more accurate, timely, and effective warnings and forecasts of high impact weather events that endanger life and property.

(b) PROGRAM ELEMENTS.—The program described in subsection (a) shall focus on the following activities:

(1) Improving the fundamental understanding of weather consistent with section 101, including the boundary layer and other processes affecting high impact weather events.

(2) Improving the understanding of how the public receives, interprets, and responds to warnings and forecasts of high impact weather events that endanger life and property.

(3) Research and development, and transfer of knowledge, technologies, and applications to the National Weather Service and other appropriate agencies and entities, including the United States weather industry and academic partners, related to—

(A) advanced radar, radar networking technologies, and other ground-based technologies, including those emphasizing rapid, fine-scale sensing of the boundary layer and lower troposphere, and the use of innovative, dual-polarization, phased-array technologies;

(B) aerial weather observing systems;

(C) high performance computing and information technology and wireless communication networks;

(D) advanced numerical weather prediction systems and forecasting tools and techniques that improve the forecasting of timing, track, intensity, and severity of high impact weather, including through—

(i) the development of more effective mesoscale models;

(ii) more effective use of existing, and the development of new, regional and national cloud-resolving models;

(iii) enhanced global weather models; and

(iv) integrated assessment models;

(E) quantitative assessment tools for measuring the impact and value of data and observing systems, including Observing System Simulation Experiments (as described

in section 107), Observing System Experiments, and Analyses of Alternatives;

(F) atmospheric chemistry and interactions essential to accurately characterizing atmospheric composition and predicting meteorological processes, including cloud microphysical, precipitation, and atmospheric electrification processes, to more effectively understand their role in severe weather; and

(G) additional sources of weather data and information, including commercial observing systems.

(4) A technology transfer initiative, carried out jointly and in coordination with the Director of the National Weather Service, and in cooperation with the United States weather industry and academic partners, to ensure continuous development and transition of the latest scientific and technological advances into operations of the National Weather Service and to establish a process to sunset outdated and expensive operational methods and tools to enable cost-effective transfer of new methods and tools into operations.

(4)[1] Advancing weather modeling skill, reclaiming and maintaining international leadership in the area of numerical weather prediction, and improving the transition of research into operations by—

(A) leveraging the weather enterprise to provide expertise on removing barriers to improving numerical weather prediction;

(B) enabling scientists and engineers to effectively collaborate in areas important for improving operational global numerical weather prediction skill, including model development, data assimilation techniques, systems architecture integration, and computational efficiencies;

(C) strengthening the National Oceanic and Atmospheric Administration's ability to undertake research projects in pursuit of substantial advancements in weather forecast skill;

(D) utilizing and leverage existing resources across the National Oceanic and Atmospheric Administration enterprise; and

(E) creating a community global weather research modeling system that—

(i) is accessible by the public;

(ii) meets basic end-user requirements for running on public computers and networks located outside of secure National Oceanic and Atmospheric Administration information and technology systems; and

(iii) utilizes, whenever appropriate and cost-effective, innovative strategies and methods, including cloud-based computing capabilities, for hosting and management of part or all of the system described in this subsection.

(c) EXTRAMURAL RESEARCH.—

[1] So in law. Section 4(a) of Public Law 115-423 added a second paragraph (4).

(1) IN GENERAL.—In carrying out the program under this section, the Assistant Administrator for Oceanic and Atmospheric Research shall collaborate with and support the non-Federal weather research community, which includes institutions of higher education, private entities, and nongovernmental organizations, by making funds available through competitive grants, contracts, and cooperative agreements.

(2) SENSE OF CONGRESS.—It is the sense of Congress that not less than 30 percent of the funds for weather research and development at the Office of Oceanic and Atmospheric Research should be made available for the purpose described in paragraph (1).

(d) ANNUAL REPORT.—Each year, concurrent with the annual budget request submitted by the President to Congress under section 1105 of title 31, United States Code, for the National Oceanic and Atmospheric Administration, the Under Secretary shall submit to Congress a description of current and planned activities under this section.

SEC. 103. [15 U.S.C. 8513] TORNADO WARNING IMPROVEMENT AND EXTENSION PROGRAM.

(a) IN GENERAL.—The Under Secretary, in collaboration with the United States weather industry and academic partners, shall establish a tornado warning improvement and extension program.

(b) GOAL.—The goal of such program shall be to reduce the loss of life and economic losses from tornadoes through the development and extension of accurate, effective, and timely tornado forecasts, predictions, and warnings, including the prediction of tornadoes beyond 1 hour in advance.

(c) PROGRAM PLAN.—Not later than 180 days after the date of the enactment of this Act, the Assistant Administrator for Oceanic and Atmospheric Research, in coordination with the Director of the National Weather Service, shall develop a program plan that details the specific research, development, and technology transfer activities, as well as corresponding resources and timelines, necessary to achieve the program goal.

(d) ANNUAL BUDGET FOR PLAN SUBMITTAL.—Following completion of the plan, the Under Secretary, acting through the Assistant Administrator for Oceanic and Atmospheric Research and in coordination with the Director of the National Weather Service, shall, not less frequently than once each year, submit to Congress a proposed budget corresponding with the activities identified in the plan.

SEC. 104. [15 U.S.C. 8514] HURRICANE FORECAST IMPROVEMENT PROGRAM.

(a) IN GENERAL.—The Under Secretary, in collaboration with the United States weather industry and such academic entities as the Administrator considers appropriate, shall maintain a project to improve hurricane forecasting.

(b) GOAL.—The goal of the project maintained under subsection (a) shall be to develop and extend accurate hurricane forecasts and warnings in order to reduce loss of life, injury, and damage to the economy, with a focus on—

(1) improving the prediction of rapid intensification and track of hurricanes;

(2) improving the forecast and communication of storm surges from hurricanes; and

(3) incorporating risk communication research to create more effective watch and warning products.

(c) PROJECT PLAN.—Not later than 1 year after the date of the enactment of this Act, the Under Secretary, acting through the Assistant Administrator for Oceanic and Atmospheric Research and in consultation with the Director of the National Weather Service, shall develop a plan for the project maintained under subsection (a) that details the specific research, development, and technology transfer activities, as well as corresponding resources and timelines, necessary to achieve the goal set forth in subsection (b).

SEC. 105. [15 U.S.C. 8515] WEATHER RESEARCH AND DEVELOPMENT PLANNING.

Not later than 1 year after the date of the enactment of this Act, and not less frequently than once each year thereafter, the Under Secretary, acting through the Assistant Administrator for Oceanic and Atmospheric Research and in coordination with the Director of the National Weather Service and the Assistant Administrator for Satellite and Information Services, shall issue a research and development and research to operations plan to restore and maintain United States leadership in numerical weather prediction and forecasting that—

(1) describes the forecasting skill and technology goals, objectives, and progress of the National Oceanic and Atmospheric Administration in carrying out the program conducted under section 102;

(2) identifies and prioritizes specific research and development activities, and performance metrics, weighted to meet the operational weather mission of the National Weather Service to achieve a weather-ready Nation;

(3) describes how the program will collaborate with stakeholders, including the United States weather industry and academic partners; and

(4) identifies, through consultation with the National Science Foundation, the United States weather industry, and academic partners, research necessary to enhance the integration of social science knowledge into weather forecast and warning processes, including to improve the communication of threat information necessary to enable improved severe weather planning and decisionmaking on the part of individuals and communities.

SEC. 106. [15 U.S.C. 8516] OBSERVING SYSTEM PLANNING.

The Under Secretary shall—

(1) develop and maintain a prioritized list of observation data requirements necessary to ensure weather forecasting capabilities to protect life and property to the maximum extent practicable;

(2) consistent with section 107, utilize Observing System Simulation Experiments, Observing System Experiments, Analyses of Alternatives, and other appropriate assessment tools to ensure continuous systemic evaluations of the observing systems, data, and information needed to meet the require-

ments of paragraph (1), including options to maximize observational capabilities and their cost-effectiveness;

(3) identify current and potential future data gaps in observing capabilities related to the requirements listed under paragraph (1); and

(4) determine a range of options to address gaps identified under paragraph (3).

SEC. 107. [15 U.S.C. 8517] OBSERVING SYSTEM SIMULATION EXPERIMENTS.

(a) IN GENERAL.—In support of the requirements of section 106, the Assistant Administrator for Oceanic and Atmospheric Research shall undertake Observing System Simulation Experiments, or such other quantitative assessments as the Assistant Administrator considers appropriate, to quantitatively assess the relative value and benefits of observing capabilities and systems. Technical and scientific Observing System Simulation Experiment evaluations—

(1) may include assessments of the impact of observing capabilities on—

(A) global weather prediction;

(B) hurricane track and intensity forecasting;

(C) tornado warning lead times and accuracy;

(D) prediction of mid-latitude severe local storm outbreaks; and

(E) prediction of storms that have the potential to cause extreme precipitation and flooding lasting from 6 hours to 1 week; and

(2) shall be conducted in cooperation with other appropriate entities within the National Oceanic and Atmospheric Administration, other Federal agencies, the United States weather industry, and academic partners to ensure the technical and scientific merit of results from Observing System Simulation Experiments or other appropriate quantitative assessment methodologies.

(b) REQUIREMENTS.—Observing System Simulation Experiments shall quantitatively—

(1) determine the potential impact of proposed space-based, suborbital, and in situ observing systems on analyses and forecasts, including potential impacts on extreme weather events across all parts of the Nation;

(2) evaluate and compare observing system design options; and

(3) assess the relative capabilities and costs of various observing systems and combinations of observing systems in providing data necessary to protect life and property.

(c) IMPLEMENTATION.—Observing System Simulation Experiments—

(1) shall be conducted prior to the acquisition of major Government-owned or Government-leased operational observing systems, including polar-orbiting and geostationary satellite systems, with a lifecycle cost of more than $500,000,000; and

(2) shall be conducted prior to the purchase of any major new commercially provided data with a lifecycle cost of more than $500,000,000.

(d) PRIORITY OBSERVING SYSTEM SIMULATION EXPERIMENTS.—

(1) GLOBAL NAVIGATION SATELLITE SYSTEM RADIO OCCULTATION.—Not later than 30 days after the date of the enactment of this Act, the Assistant Administrator for Oceanic and Atmospheric Research shall complete an Observing System Simulation Experiment to assess the value of data from Global Navigation Satellite System Radio Occultation.

(2) GEOSTATIONARY HYPERSPECTRAL SOUNDER GLOBAL CONSTELLATION.—Not later than 120 days after the date of the enactment of this Act, the Assistant Administrator for Oceanic and Atmospheric Research shall complete an Observing System Simulation Experiment to assess the value of data from a geostationary hyperspectral sounder global constellation.

(e) RESULTS.—Upon completion of all Observing System Simulation Experiments, the Assistant Administrator shall make available to the public the results an assessment of related private and public sector weather data sourcing options, including their availability, affordability, and cost-effectiveness. Such assessments shall be developed in accordance with section 50503 of title 51, United States Code.

SEC. 108. [15 U.S.C. 8518] COMPUTING RESOURCE EFFICIENCY IMPROVEMENT AND ANNUAL REPORT.

(a) COMPUTING RESOURCES.—

(1) IN GENERAL.—In acquiring computing capabilities, including high performance computing technologies and supercomputing technologies, that enable the National Oceanic and Atmospheric Administration to meet its mission requirements, the Under Secretary shall, when appropriate and cost-effective, assess and prioritize options for entering into multi-year lease agreements for computing capabilities over options for purchasing computing hardware outright.

(2) ACQUISITION.—In carrying out the requirements of paragraph (1), the Under Secretary shall structure multi-year lease agreements in such a manner that the expiration of the lease is set for a date on or around—

(A) the expected degradation point of the computing resources; or

(B) the point at which significantly increased computing capabilities are expected to be available for lease.

(3) PILOT PROGRAMS.—

(A) IN GENERAL.—In order to more efficiently and effectively meet the mission requirements of the National Oceanic and Atmospheric Administration, the Under Secretary may create 1 or more pilot programs for assessing new or innovative information and technology capabilities and services.

(B) PROGRAM REQUIREMENTS.—Any program created under paragraph (3) shall assess only those capabilities and services that—

(i) meet or exceed the standards and requirements of the National Oceanic and Atmospheric Administra-

tion, including for processing speed, cybersecurity, and overall reliability; or

(ii) meet or exceed, or are expected to meet or exceed, the performance of similar, in-house information and technology capabilities and services that are owned and operated by the National Oceanic and Atmospheric Administration prior to the establishment of the pilot program.

(C) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated, out of funds appropriated to the National Environmental Satellite, Data, and Information Service, to carry out this paragraph $5,000,000 for fiscal year 2019, $10,000,000 for fiscal year 2020, and $5,000,000 for each of fiscal years 2021 through 2023, to remain available until expended.

(b) REPORTS.—Not later than 1 year after the date of enactment of the National Integrated Drought Information System Reauthorization Act of 2018, and triennially thereafter until the date that is 6 years after the date on which the first report is submitted, the Under Secretary, acting through the Chief Information Officer of the National Oceanic and Atmospheric Administration and in coordination with the Assistant Administrator for Oceanic and Atmospheric Research and the Director of the National Weather Service, shall produce and make publicly available a report that explains how the Under Secretary intends—

(1) to continually support upgrades to pursue the fastest, most powerful, and cost-effective high performance computing technologies in support of its weather prediction mission;

(2) to ensure a balance between the research to operations requirements to develop the next generation of regional and global models as well as highly reliable operational models;

(3) to take advantage of advanced development concepts to, as appropriate, make next generation weather prediction models available in beta-test mode to operational forecasters, the United States weather industry, and partners in academic and Government research;

(4) to use existing computing resources to improve advanced research and operational weather prediction;

(5) to utilize non-Federal contracts to obtain the necessary expertise for advanced weather computing, if appropriate;

(6) to utilize cloud computing; and

(7) to create a long-term strategy to transition the programming language of weather model code to current and broadly-used coding language.

SEC. 109. UNITED STATES WEATHER RESEARCH PROGRAM.

Section 108 of the Oceanic and Atmospheric Administration Authorization Act of 1992 (Public Law 102-567; 15 U.S.C. 313 note) is amended—

(1) in subsection (a)—

(A) in paragraph (3), by striking "; and" and inserting a semicolon;

(B) in paragraph (4), by striking the period at the end and inserting a semicolon; and

(C) by inserting after paragraph (4) the following:

"(5) submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives, not less frequently than once each year, a report, including—

"(A) a list of ongoing research projects;

"(B) project goals and a point of contact for each project;

"(C) the five projects related to weather observations, short-term weather, or subseasonal forecasts within Office of Oceanic and Atmospheric Research that are closest to operationalization;

"(D) for each project referred to in subparagraph (C)—

"(i) the potential benefit;

"(ii) any barrier to operationalization; and

"(iii) the plan for operationalization, including which line office will financially support the project and how much the line office intends to spend;

"(6) establish teams with staff from the Office of Oceanic and Atmospheric Research and the National Weather Service to oversee the operationalization of research products developed by the Office of Oceanic and Atmospheric Research;

"(7) develop mechanisms for research priorities of the Office of Oceanic and Atmospheric Research to be informed by the relevant line offices within the National Oceanic and Atmospheric Administration, the relevant user community, and the weather enterprise;

"(8) develop an internal mechanism to track the progress of each research project within the Office of Oceanic and Atmospheric Research and mechanisms to terminate a project that is not adequately progressing;

"(9) develop and implement a system to track whether extramural research grant goals were accomplished;

"(10) provide facilities for products developed by the Office of Oceanic and Atmospheric Research to be tested in operational simulations, such as test beds; and

"(11) encourage academic collaboration with the Office of Oceanic and Atmospheric Research and the National Weather Service by facilitating visiting scholars.";

(2) in subsection (b), in the matter preceding paragraph (1), by striking "Not later than 90 days after the date of enactment of this Act, the" and inserting "The"; and

(3) by adding at the end the following new subsection:

"(c) SUBSEASONAL DEFINED.—In this section, the term 'subseasonal' means the time range between 2 weeks and 3 months.".

SEC. 110. [15 U.S.C. 8519] AUTHORIZATION OF APPROPRIATIONS.

(a) IN GENERAL.—There are authorized to be appropriated to the Office of Oceanic and Atmospheric Research to carry out this title—

(1) $136,516,000 for fiscal year 2019, of which—

(A) $85,758,000 is authorized for weather laboratories and cooperative institutes;

(B) $30,758,000 is authorized for weather and air chemistry research programs; and

(C) $20,000,000 is authorized for the joint technology transfer initiative described in section 102(b)(4);

(2) $148,154,000 for fiscal year 2020, of which—

(A) $87,258,000 is authorized for weather laboratories and cooperative institutes;

(B) $40,896,000 is authorized for weather and air chemistry research programs; and

(C) $20,000,000 is authorized for the joint technology transfer initiative described in section 102(b)(4);

(3) $150,154,000 for fiscal year 2021, of which—

(A) $88,758,000 is authorized for weather laboratories and cooperative institutes;

(B) $41,396,000 is authorized for weather and air chemistry research programs; and

(C) $20,000,000 is authorized for the joint technology transfer initiative described in section 102(b)(4);

(4) $152,154,000 for fiscal year 2022, of which—

(A) $90,258,000 is authorized for weather laboratories and cooperative institutes;

(B) $41,896,000 is authorized for weather and air chemistry research programs; and

(C) $20,000,000 is authorized for the joint technology transfer initiative described in section 102(b)(4); and

(5) $154,154,000 for fiscal year 2023, of which—

(A) $91,758,000 is authorized for weather laboratories and cooperative institutes;

(B) $42,396,000 is authorized for weather and air chemistry research programs; and

(C) $20,000,000 is authorized for the joint technology transfer initiative described in section 102(b)(4).

(b) LIMITATION.—No additional funds are authorized to carry out this title and the amendments made by this title.

TITLE II—SUBSEASONAL AND SEASONAL FORECASTING INNOVATION

SEC. 201. IMPROVING SUBSEASONAL AND SEASONAL FORECASTS.

Section 1762 of the Food Security Act of 1985 (Public Law 99-198; 15 U.S.C. 313 note) is amended—

(1) in subsection (a), by striking "(a)" and inserting "(a) Findings.—";

(2) in subsection (b), by striking "(b)" and inserting "(b) Policy.—"; and

(3) by adding at the end the following:

"(c) FUNCTIONS.—The Under Secretary, acting through the Director of the National Weather Service and the heads of such other programs of the National Oceanic and Atmospheric Administration as the Under Secretary considers appropriate, shall—

"(1) collect and utilize information in order to make usable, reliable, and timely foundational forecasts of subseasonal and seasonal temperature and precipitation;

"(2) leverage existing research and models from the weather enterprise to improve the forecasts under paragraph (1);

"(3) determine and provide information on how the forecasted conditions under paragraph (1) may impact—

"(A) the number and severity of droughts, fires, tornadoes, hurricanes, floods, heat waves, coastal inundation, winter storms, high impact weather, or other relevant natural disasters;

"(B) snowpack; and

"(C) sea ice conditions; and

"(4) develop an Internet clearinghouse to provide the forecasts under paragraph (1) and the information under paragraphs (1) and (3) on both national and regional levels.

"(d) COMMUNICATION.—The Director of the National Weather Service shall provide the forecasts under paragraph (1) of subsection (c) and the information on their impacts under paragraph (3) of such subsection to the public, including public and private entities engaged in planning and preparedness, such as National Weather Service Core partners at the Federal, regional, State, tribal, and local levels of government.

"(e) COOPERATION.—The Under Secretary shall build upon existing forecasting and assessment programs and partnerships, including—

"(1) by designating research and monitoring activities related to subseasonal and seasonal forecasts as a priority in one or more solicitations of the Cooperative Institutes of the Office of Oceanic and Atmospheric Research;

"(2) by contributing to the interagency Earth System Prediction Capability; and

"(3) by consulting with the Secretary of Defense and the Secretary of Homeland Security to determine the highest priority subseasonal and seasonal forecast needs to enhance national security.

"(f) FORECAST COMMUNICATION COORDINATORS.—

"(1) IN GENERAL.—The Under Secretary shall foster effective communication, understanding, and use of the forecasts by the intended users of the information described in subsection (d). This may include assistance to States for forecast communication coordinators to enable local interpretation and planning based on the information.

"(2) REQUIREMENTS.—For each State that requests assistance under this subsection, the Under Secretary may—

"(A) provide funds to support an individual in that State—

"(i) to serve as a liaison among the National Oceanic and Atmospheric Administration, other Federal departments and agencies, the weather enterprise, the State, and relevant interests within that State; and

"(ii) to receive the forecasts and information under subsection (c) and disseminate the forecasts and information throughout the State, including to county and tribal governments; and

"(B) require matching funds of at least 50 percent, from the State, a university, a nongovernmental organization, a trade association, or the private sector.

"(3) LIMITATION.—Assistance to an individual State under this subsection shall not exceed $100,000 in a fiscal year.

"(g) COOPERATION FROM OTHER FEDERAL AGENCIES.—Each Federal department and agency shall cooperate as appropriate with the Under Secretary in carrying out this section.

"(h) REPORTS.—

"(1) IN GENERAL.—Not later than 18 months after the date of the enactment of the Weather Research and Forecasting Innovation Act of 2017, the Under Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report, including—

"(A) an analysis of the how information from the National Oceanic and Atmospheric Administration on subseasonal and seasonal forecasts, as provided under subsection (c), is utilized in public planning and preparedness;

"(B) specific plans and goals for the continued development of the subseasonal and seasonal forecasts and related products described in subsection (c); and

"(C) an identification of research, monitoring, observing, and forecasting requirements to meet the goals described in subparagraph (B).

"(2) CONSULTATION.—In developing the report under paragraph (1), the Under Secretary shall consult with relevant Federal, regional, State, tribal, and local government agencies, research institutions, and the private sector.

"(i) DEFINITIONS.—In this section:

"(1) FOUNDATIONAL FORECAST.—The term 'foundational forecast' means basic weather observation and forecast data, largely in raw form, before further processing is applied.

"(2) NATIONAL WEATHER SERVICE CORE PARTNERS.—The term 'National Weather Service core partners' means government and nongovernment entities which are directly involved in the preparation or dissemination of, or discussions involving, hazardous weather or other emergency information put out by the National Weather Service.

"(3) SEASONAL.—The term 'seasonal' means the time range between 3 months and 2 years.

"(4) STATE.—The term 'State' means a State, a territory, or possession of the United States, including a Commonwealth, or the District of Columbia.

"(5) SUBSEASONAL.—The term 'subseasonal' means the time range between 2 weeks and 3 months.

"(6) UNDER SECRETARY.—The term 'Under Secretary' means the Under Secretary of Commerce for Oceans and Atmosphere.

"(7) WEATHER INDUSTRY AND WEATHER ENTERPRISE.—The terms 'weather industry' and 'weather enterprise' are interchangeable in this section and include individuals and organizations from public, private, and academic sectors that contribute to the research, development, and production of weath-

er forecast products, and primary consumers of these weather forecast products.

"(j) AUTHORIZATION OF APPROPRIATIONS.—For each of fiscal years 2017 and 2018, there are authorized out of funds appropriated to the National Weather Service, $26,500,000 to carry out the activities of this section.".

TITLE III—WEATHER SATELLITE AND DATA INNOVATION

SEC. 301. [15 U.S.C. 8531 note] NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION SATELLITE AND DATA MANAGEMENT.

(a) SHORT-TERM MANAGEMENT OF ENVIRONMENTAL OBSERVATIONS.—

(1) MICROSATELLITE CONSTELLATIONS.—

(A) IN GENERAL.—The Under Secretary shall complete and operationalize the Constellation Observing System for Meteorology, Ionosphere, and Climate-1 and Climate-2 (COSMIC) in effect on the day before the date of the enactment of this Act—

(i) by deploying constellations of microsatellites in both the equatorial and polar orbits;

(ii) by integrating the resulting data and research into all national operational and research weather forecast models; and

(iii) by ensuring that the resulting data of National Oceanic and Atmospheric Administration's COSMIC-1 and COSMIC-2 programs are free and open to all communities.

(B) ANNUAL REPORTS.—Not less frequently than once each year until the Under Secretary has completed and operationalized the program described in subparagraph (A) pursuant to such subparagraph, the Under Secretary shall submit to Congress a report on the status of the efforts of the Under Secretary to carry out such subparagraph.

(2) INTEGRATION OF OCEAN AND COASTAL DATA FROM THE INTEGRATED OCEAN OBSERVING SYSTEM.—In National Weather Service Regions where the Director of the National Weather Service determines that ocean and coastal data would improve forecasts, the Director, in consultation with the Assistant Administrator for Oceanic and Atmospheric Research and the Assistant Administrator of the National Ocean Service, shall—

(A) integrate additional coastal and ocean observations, and other data and research, from the Integrated Ocean Observing System (IOOS) into regional weather forecasts to improve weather forecasts and forecasting decision support systems;

(B) support the development of real-time data sharing products and forecast products in collaboration with the regional associations of such system, including contributions from the private sector, academia, and research institutions to ensure timely and accurate use of ocean and coastal data in regional forecasts; and

(C) support increasing use of autonomous, mobile surface, sub-surface, and submarine vehicle ocean and fresh water sensor systems and the infrastructure necessary to share and analyze these data in real-time and feed them into predictive early warning systems.

(3) EXISTING MONITORING AND OBSERVATION-CAPABILITY.—The Under Secretary shall identify degradation of existing monitoring and observation capabilities that could lead to a reduction in forecast quality.

(4) SPECIFICATIONS FOR NEW SATELLITE SYSTEMS OR DATA DETERMINED BY OPERATIONAL NEEDS.—In developing specifications for any satellite systems or data to follow the Joint Polar Satellite System, Geostationary Operational Environmental Satellites, and any other satellites, in effect on the day before the date of enactment of this Act, the Under Secretary shall ensure the specifications are determined to the extent practicable by the recommendations of the reports under subsection (b) of this section.

(b) INDEPENDENT STUDY ON FUTURE OF NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION SATELLITE SYSTEMS AND DATA.—

(1) AGREEMENT.—

(A) IN GENERAL.—The Under Secretary shall seek to enter into an agreement with the National Academy of Sciences to perform the services covered by this subsection.

(B) TIMING.—The Under Secretary shall seek to enter into the agreement described in subparagraph (A) before September 30, 2018.

(2) STUDY.—

(A) IN GENERAL.—Under an agreement between the Under Secretary and the National Academy of Sciences under this subsection, the National Academy of Sciences shall conduct a study on matters concerning future satellite data needs.

(B) ELEMENTS.—In conducting the study under subparagraph (A), the National Academy of Sciences shall—

(i) develop recommendations on how to make the data portfolio of the Administration more robust and cost-effective;

(ii) assess the costs and benefits of moving toward a constellation of many small satellites, standardizing satellite bus design, relying more on the purchasing of data, or acquiring data from other sources or methods;

(iii) identify the environmental observations that are essential to the performance of weather models, based on an assessment of Federal, academic, and private sector weather research, and the cost of obtaining the environmental data;

(iv) identify environmental observations that improve the quality of operational and research weather models in effect on the day before the date of enactment of this Act;

(v) identify and prioritize new environmental observations that could contribute to existing and future weather models; and

(vi) develop recommendations on a portfolio of environmental observations that balances essential, quality-improving, and new data, private and nonprivate sources, and space-based and Earth-based sources.

(C) DEADLINE AND REPORT.—In carrying out the study under subparagraph (A), the National Academy of Sciences shall complete and transmit to the Under Secretary a report containing the findings of the National Academy of Sciences with respect to the study not later than 2 years after the date on which the Administrator enters into an agreement with the National Academy of Sciences under paragraph (1)(A).

(3) ALTERNATE ORGANIZATION.—

(A) IN GENERAL.—If the Under Secretary is unable within the period prescribed in subparagraph (B) of paragraph (1) to enter into an agreement described in subparagraph (A) of such paragraph with the National Academy of Sciences on terms acceptable to the Under Secretary, the Under Secretary shall seek to enter into such an agreement with another appropriate organization that—

(i) is not part of the Federal Government;

(ii) operates as a not-for-profit entity; and

(iii) has expertise and objectivity comparable to that of the National Academy of Sciences.

(B) TREATMENT.—If the Under Secretary enters into an agreement with another organization as described in subparagraph (A), any reference in this subsection to the National Academy of Sciences shall be treated as a reference to the other organization.

(4) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated, out of funds appropriated to National Environmental Satellite, Data, and Information Service, to carry out this subsection $1,000,000 for the period encompassing fiscal years 2018 through 2019.

(c) NEXT GENERATION SATELLITE ARCHITECTURE.—

(1) IN GENERAL.—The Under Secretary shall analyze, test, and plan the procurement of future data sources and satellite architectures, including respective ground system elements, identified in the National Oceanic and Atmospheric Administration's Satellite Observing System Architecture Study that—

(A) lower the cost of observations used to meet the National Oceanic and Atmospheric Administration's mission requirements;

(B) disaggregate current satellite systems, where appropriate;

(C) include new, value-adding technological advancements; and

(D) improve—

(i) weather and climate forecasting and predictions; and

(ii) the understanding, management, and exploration of the ocean.

(2) QUANTITATIVE ASSESSMENTS AND PARTNERSHIP AUTHORITY.—In meeting the requirements described in paragraph (1), the Under Secretary—

(A) may partner with the commercial and academic sectors, non-governmental and not-for-profit organizations, and other Federal agencies; and

(B) shall, consistent with section 107 of this Act, undertake quantitative assessments for objective analyses, as the Under Secretary considers appropriate, to evaluate relative value and benefits of future data sources and satellite architectures described in paragraph (1).

(d) ADDITIONAL FORMS OF TRANSACTION AUTHORIZED.—

(1) IN GENERAL.—Subject to paragraph (2), in order to enhance the effectiveness of data, satellite, and other observing systems used by the National Oceanic and Atmospheric Administration to meet its missions, the Under Secretary may enter into and perform such transaction agreements on such terms as the Under Secretary considers appropriate to carry out—

(A) basic, applied, and advanced research projects and ocean exploration missions to meet the objectives described in subparagraphs (A) through (D) of subsection (c)(1); or

(B) any other type of project to meet other mission objectives, as determined by the Under Secretary.

(2) METHOD AND SCOPE.—

(A) IN GENERAL.—A transaction agreement under paragraph (1) shall be limited to research and development activities.

(B) PERMISSIBLE USES.—A transaction agreement under paragraph (1) may be used—

(i) for the construction, use, operation, or procurement of new, improved, innovative, or value-adding systems, including satellites, instrumentation, ground stations, data, and data processing;

(ii) to make determinations on how to best use existing or planned data, systems, and assets of the National Oceanic and Atmospheric Administration; and

(iii) only when the objectives of the National Oceanic and Atmospheric Administration cannot be met using a cooperative research and development agreement, grants procurement contract, or cooperative agreement.

(3) TERMINATION OF EFFECTIVENESS.—The authority provided in this subsection terminates effective September 30, 2030.

(e) TRANSPARENCY.—Not later than 60 days after the date that a transaction agreement is made under subsection (d), the Under Secretary shall make publicly available, in a searchable format, on the website of the National Oceanic and Atmospheric Administration all uses of the authority under subsection (d), including an estimate of committed National Oceanic and Atmospheric Administration resources and the expected benefits to National Oceanic and

Atmospheric Administration objectives for the transaction agreement, with appropriate redactions for proprietary, sensitive, or classified information.

(f) REPORTS.—

(1) IN GENERAL.—Not later than 90 days after September 30 of each fiscal year through September 30, 2023, the Under Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report on the use of additional transaction authority by the National Oceanic and Atmospheric Administration during the previous fiscal year.

(2) CONTENTS.—Each report shall include—

(A) for each transaction agreement in effect during the fiscal year covered by the report—

(i) an indication of whether the transaction agreement is a reimbursable, non-reimbursable, or funded agreement;

(ii) a description of—

(I) the subject and terms;

(II) the parties;

(III) the responsible National Oceanic and Atmospheric Administration line office;

(IV) the value;

(V) the extent of the cost sharing among Federal Government and non-Federal sources;

(VI) the duration or schedule; and

(VII) all milestones;

(iii) an indication of whether the transaction agreement was renewed during the previous fiscal year;

(iv) the technology areas in which research projects were conducted under that agreement;

(v) the extent to which the use of that agreement—

(I) has contributed to a broadening of the technology and industrial base available for meeting National Oceanic and Atmospheric Administration needs; and

(II) has fostered within the technology and industrial base new relationships and practices that support the United States; and

(vi) the total value received by the Federal Government under that agreement for that fiscal year; and

(B) a list of all anticipated reimbursable, non-reimbursable, and funded transaction agreements for the upcoming fiscal year.

(g) RULE OF CONSTRUCTION.—Nothing in this section may be construed as limiting the authority of the National Oceanic and Atmospheric Administration to use cooperative research and development agreements, grants, procurement contracts, or cooperative agreements.

SEC. 302. [15 U.S.C. 8532] COMMERCIAL WEATHER DATA.

(a) DATA AND HOSTED SATELLITE PAYLOADS.—Notwithstanding any other provision of law, the Secretary of Commerce may enter into agreements for—

(1) the purchase of weather data through contracts with commercial providers; and

(2) the placement of weather satellite instruments on cohosted government or private payloads.

(b) STRATEGY.—

(1) IN GENERAL.—Not later than 180 days after the date of the enactment of this Act, the Secretary of Commerce, in consultation with the Under Secretary, shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a strategy to enable the procurement of quality commercial weather data. The strategy shall assess the range of commercial opportunities, including public-private partnerships, for obtaining surface-based, aviation-based, and space-based weather observations. The strategy shall include the expected cost-effectiveness of these opportunities as well as provide a plan for procuring data, including an expected implementation timeline, from these nongovernmental sources, as appropriate.

(2) REQUIREMENTS.—The strategy shall include—

(A) an analysis of financial or other benefits to, and risks associated with, acquiring commercial weather data or services, including through multiyear acquisition approaches;

(B) an identification of methods to address planning, programming, budgeting, and execution challenges to such approaches, including—

(i) how standards will be set to ensure that data is reliable and effective;

(ii) how data may be acquired through commercial experimental or innovative techniques and then evaluated for integration into operational use;

(iii) how to guarantee public access to all forecast-critical data to ensure that the United States weather industry and the public continue to have access to information critical to their work; and

(iv) in accordance with section 50503 of title 51, United States Code, methods to address potential termination liability or cancellation costs associated with weather data or service contracts; and

(C) an identification of any changes needed in the requirements development and approval processes of the Department of Commerce to facilitate effective and efficient implementation of such strategy.

(3) AUTHORITY FOR AGREEMENTS.—The Assistant Administrator for National Environmental Satellite, Data, and Information Service may enter into multiyear agreements necessary to carry out the strategy developed under this subsection.

(c) PILOT PROGRAM.—

(1) CRITERIA.—Not later than 30 days after the date of the enactment of this Act, the Under Secretary shall publish data and metadata standards and specifications for space-based commercial weather data, including radio occultation data, and, as soon as possible, geostationary hyperspectral sounder data.

(2) PILOT CONTRACTS.—

(A) CONTRACTS.—Not later than 90 days after the date of enactment of this Act, the Under Secretary shall, through an open competition, enter into at least one pilot contract with one or more private sector entities capable of providing data that meet the standards and specifications set by the Under Secretary for providing commercial weather data in a manner that allows the Under Secretary to calibrate and evaluate the data for its use in National Oceanic and Atmospheric Administration meteorological models.

(B) ASSESSMENT OF DATA VIABILITY.—Not later than the date that is 3 years after the date on which the Under Secretary enters into a contract under subparagraph (A), the Under Secretary shall assess and submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives the results of a determination of the extent to which data provided under the contract entered into under subparagraph (A) meet the criteria published under paragraph (1) and the extent to which the pilot program has demonstrated—

(i) the viability of assimilating the commercially provided data into National Oceanic and Atmospheric Administration meteorological models;

(ii) whether, and by how much, the data add value to weather forecasts; and

(iii) the accuracy, quality, timeliness, validity, reliability, usability, information technology security, and cost-effectiveness of obtaining commercial weather data from private sector providers.

(3) AUTHORIZATION OF APPROPRIATIONS.—For each of fiscal years 2019 through 2023, there are authorized to be appropriated for procurement, acquisition, and construction at the National Environmental Satellite, Data, and Information Service, $6,000,000 to carry out this subsection.

(d) OBTAINING FUTURE DATA.—If an assessment under subsection (c)(2)(B) demonstrates the ability of commercial weather data to meet data and metadata standards and specifications published under subsection (c)(1), the Under Secretary shall—

(1) where appropriate, cost-effective, and feasible, obtain commercial weather data from private sector providers;

(2) as early as possible in the acquisition process for any future National Oceanic and Atmospheric Administration meteorological space system, consider whether there is a suitable, cost-effective, commercial capability available or that will be available to meet any or all of the observational requirements by the planned operational date of the system;

(3) if a suitable, cost-effective, commercial capability is or will be available as described in paragraph (2), determine whether it is in the national interest to develop a governmental meteorological space system; and

(4) submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report detailing any determination made under paragraphs (2) and (3).

(e) DATA SHARING PRACTICES.—The Under Secretary shall continue to meet the international meteorological agreements into which the Under Secretary has entered, including practices set forth through World Meteorological Organization Resolution 40.

SEC. 303. [15 U.S.C. 8533] UNNECESSARY DUPLICATION.

In meeting the requirements under this title, the Under Secretary shall avoid unnecessary duplication between public and private sources of data and the corresponding expenditure of funds and employment of personnel.

TITLE IV—FEDERAL WEATHER COORDINATION

SEC. 401. [15 U.S.C. 8541] ENVIRONMENTAL INFORMATION SERVICES WORKING GROUP.

(a) ESTABLISHMENT.—The National Oceanic and Atmospheric Administration Science Advisory Board shall continue to maintain a standing working group named the Environmental Information Services Working Group (in this section referred to as the "Working Group")—

(1) to provide advice for prioritizing weather research initiatives at the National Oceanic and Atmospheric Administration to produce real improvement in weather forecasting;

(2) to provide advice on existing or emerging technologies or techniques that can be found in private industry or the research community that could be incorporated into forecasting at the National Weather Service to improve forecasting skill;

(3) to identify opportunities to improve—

(A) communications between weather forecasters, Federal, State, local, tribal, and other emergency management personnel, and the public; and

(B) communications and partnerships among the National Oceanic and Atmospheric Administration and the private and academic sectors; and

(4) to address such other matters as the Science Advisory Board requests of the Working Group.

(b) COMPOSITION.—

(1) IN GENERAL.—The Working Group shall be composed of leading experts and innovators from all relevant fields of science and engineering including atmospheric chemistry, atmospheric physics, meteorology, hydrology, social science, risk communications, electrical engineering, and computer sciences. In carrying out this section, the Working Group may organize into subpanels.

(2) NUMBER.—The Working Group shall be composed of no fewer than 15 members. Nominees for the Working Group may be forwarded by the Working Group for approval by the Science Advisory Board. Members of the Working Group may choose a chair (or co-chairs) from among their number with approval by the Science Advisory Board.

(c) ANNUAL REPORT.—Not less frequently than once each year, the Working Group shall transmit to the Science Advisory Board for submission to the Under Secretary a report on progress made by National Oceanic and Atmospheric Administration in adopting the Working Group's recommendations. The Science Advisory Board shall transmit this report to the Under Secretary. Within 30 days of receipt of such report, the Under Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a copy of such report.

SEC. 402. [15 U.S.C. 8542] INTERAGENCY WEATHER RESEARCH AND FORECAST INNOVATION COORDINATION.

(a) ESTABLISHMENT.—The Director of the Office of Science and Technology Policy shall establish an Interagency Committee for Advancing Weather Services to improve coordination of relevant weather research and forecast innovation activities across the Federal Government. The Interagency Committee shall—

(1) include participation by the National Aeronautics and Space Administration, the Federal Aviation Administration, National Oceanic and Atmospheric Administration and its constituent elements, the National Science Foundation, and such other agencies involved in weather forecasting research as the President determines are appropriate;

(2) identify and prioritize top forecast needs and coordinate those needs against budget requests and program initiatives across participating offices and agencies; and

(3) share information regarding operational needs and forecasting improvements across relevant agencies.

(b) CO-CHAIR.—The Federal Coordinator for Meteorology shall serve as a co-chair of this panel.

(c) FURTHER COORDINATION.—The Director of the Office of Science and Technology Policy shall take such other steps as are necessary to coordinate the activities of the Federal Government with those of the United States weather industry, State governments, emergency managers, and academic researchers.

SEC. 403. [15 U.S.C. 8543] OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH AND NATIONAL WEATHER SERVICE EXCHANGE PROGRAM.

(a) IN GENERAL.—The Assistant Administrator for Oceanic and Atmospheric Research and the Director of National Weather Service may establish a program to detail Office of Oceanic and Atmospheric Research personnel to the National Weather Service and National Weather Service personnel to the Office of Oceanic and Atmospheric Research.

(b) GOAL.—The goal of this program is to enhance forecasting innovation through regular, direct interaction between the Office of Oceanic and Atmospheric Research's world-class scientists and the National Weather Service's operational staff.

(c) ELEMENTS.—The program shall allow up to 10 Office of Oceanic and Atmospheric Research staff and National Weather Service staff to spend up to 1 year on detail. Candidates shall be jointly selected by the Assistant Administrator for Oceanic and Atmospheric Research and the Director of the National Weather Service.

(d) ANNUAL REPORT.—Not less frequently than once each year, the Under Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report on participation in such program and shall highlight any innovations that come from this interaction.

SEC. 404. [15 U.S.C. 8544] VISITING FELLOWS AT NATIONAL WEATHER SERVICE.

(a) IN GENERAL.—The Director of the National Weather Service may establish a program to host postdoctoral fellows and academic researchers at any of the National Centers for Environmental Prediction.

(b) GOAL.—This program shall be designed to provide direct interaction between forecasters and talented academic and private sector researchers in an effort to bring innovation to forecasting tools and techniques to the National Weather Service.

(c) SELECTION AND APPOINTMENT.—Such fellows shall be competitively selected and appointed for a term not to exceed 1 year.

SEC. 405. [15 U.S.C. 8545] WARNING COORDINATION METEOROLOGISTS AT WEATHER FORECAST OFFICES OF NATIONAL WEATHER SERVICE.

(a) DESIGNATION OF WARNING COORDINATION METEOROLOGISTS.—

(1) IN GENERAL.—The Director of the National Weather Service shall designate at least one warning coordination meteorologist at each weather forecast office of the National Weather Service.

(2) NO ADDITIONAL EMPLOYEES AUTHORIZED.—Nothing in this section shall be construed to authorize or require a change in the authorized number of full time equivalent employees in the National Weather Service or otherwise result in the employment of any additional employees.

(3) PERFORMANCE BY OTHER EMPLOYEES.—Performance of the responsibilities outlined in this section is not limited to the warning coordination meteorologist position.

(b) PRIMARY ROLE OF WARNING COORDINATION METEOROLOGISTS.—The primary role of the warning coordination meteorologist shall be to carry out the responsibilities required by this section.

(c) RESPONSIBILITIES.—

(1) IN GENERAL.—Subject to paragraph (2), consistent with the analysis described in section 409, and in order to increase impact-based decision support services, each warning coordination meteorologist designated under subsection (a) shall—

(A) be responsible for providing service to the geographic area of responsibility covered by the weather forecast office at which the warning coordination meteorologist is employed to help ensure that users of products of the National Weather Service can respond effectively to improve outcomes from weather events;

(B) liaise with users of products and services of the National Weather Service, such as the public, media outlets, users in the aviation, marine, and agricultural communities, and forestry, land, and water management interests, to evaluate the adequacy and usefulness of the products and services of the National Weather Service;

(C) collaborate with such weather forecast offices and State, local, and tribal government agencies as the Director considers appropriate in developing, proposing, and implementing plans to develop, modify, or tailor products and services of the National Weather Service to improve the usefulness of such products and services;

(D) ensure the maintenance and accuracy of severe weather call lists, appropriate office severe weather policy or procedures, and other severe weather or dissemination methodologies or strategies; and

(E) work closely with State, local, and tribal emergency management agencies, and other agencies related to disaster management, to ensure a planned, coordinated, and effective preparedness and response effort.

(2) OTHER STAFF.—The Director may assign a responsibility set forth in paragraph (1) to such other staff as the Director considers appropriate to carry out such responsibility.

(d) ADDITIONAL RESPONSIBILITIES.—

(1) IN GENERAL.—Subject to paragraph (2), a warning coordination meteorologist designated under subsection (a) may—

(A) work with a State agency to develop plans for promoting more effective use of products and services of the National Weather Service throughout the State;

(B) identify priority community preparedness objectives;

(C) develop plans to meet the objectives identified under paragraph (2); and

(D) conduct severe weather event preparedness planning and citizen education efforts with and through various State, local, and tribal government agencies and other disaster management-related organizations.

(2) OTHER STAFF.—The Director may assign a responsibility set forth in paragraph (1) to such other staff as the Director considers appropriate to carry out such responsibility.

(e) PLACEMENT WITH STATE AND LOCAL EMERGENCY MANAGERS.—

(1) IN GENERAL.—In carrying out this section, the Director of the National Weather Service may place a warning coordination meteorologist designated under subsection (a) with a State or local emergency manager if the Director considers doing so is necessary or convenient to carry out this section.

(2) TREATMENT.—If the Director determines that the placement of a warning coordination meteorologist placed with a State or local emergency manager under paragraph (1) is near a weather forecast office of the National Weather Service, such placement shall be treated as designation of the warning co-

ordination meteorologist at such weather forecast office for purposes of subsection (a).

SEC. 406. IMPROVING NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION COMMUNICATION OF HAZARDOUS WEATHER AND WATER EVENTS.

(a) PURPOSE OF SYSTEM.—For purposes of the assessment required by subsection (b)(1)(A), the purpose of National Oceanic and Atmospheric Administration system for issuing watches and warnings regarding hazardous weather and water events shall be risk communication to the general public that informs action to prevent loss of life and property.

(b) ASSESSMENT OF SYSTEM.—

(1) IN GENERAL.—Not later than 2 years after the date of the enactment of this Act, the Under Secretary shall—

(A) assess the National Oceanic and Atmospheric Administration system for issuing watches and warnings regarding hazardous weather and water events; and

(B) submit to Congress a report on the findings of the Under Secretary with respect to the assessment conducted under subparagraph (A).

(2) ELEMENTS.—The assessment required by paragraph (1)(A) shall include the following:

(A) An evaluation of whether the National Oceanic and Atmospheric Administration system for issuing watches and warnings regarding hazardous weather and water events meets the purpose described in subsection (a).

(B) Development of recommendations for—

(i) legislative and administrative action to improve the system described in paragraph (1)(A); and

(ii) such research as the Under Secretary considers necessary to address the focus areas described in paragraph (3).

(3) FOCUS AREAS.—The assessment required by paragraph (1)(A) shall focus on the following:

(A) Ways to communicate the risks posed by hazardous weather or water events to the public that are most likely to result in action to mitigate the risk.

(B) Ways to communicate the risks posed by hazardous weather or water events to the public as broadly and rapidly as practicable.

(C) Ways to preserve the benefits of the existing watches and warnings system.

(D) Ways to maintain the utility of the watches and warnings system for Government and commercial users of the system.

(4) CONSULTATION.—In conducting the assessment required by paragraph (1)(A), the Under Secretary shall—

(A) consult with such line offices within the National Oceanic and Atmospheric Administration as the Under Secretary considers relevant, including the National Ocean Service, the National Weather Service, and the Office of Oceanic and Atmospheric Research;

(B) consult with individuals in the academic sector, including individuals in the field of social and behavioral sciences, and other weather services;

(C) consult with media outlets that will be distributing the watches and warnings;

(D) consult with non-Federal forecasters that produce alternate severe weather risk communication products;

(E) consult with emergency planners and responders, including State and local emergency management agencies, and other government users of the watches and warnings system, including the Federal Emergency Management Agency, the Office of Personnel Management, the Coast Guard, and such other Federal agencies as the Under Secretary determines rely on watches and warnings for operational decisions; and

(F) make use of the services of the National Academy of Sciences, as the Under Secretary considers necessary and practicable, including contracting with the National Research Council to review the scientific and technical soundness of the assessment required by paragraph (1)(A), including the recommendations developed under paragraph (2)(B).

(5) METHODOLOGIES.—In conducting the assessment required by paragraph (1)(A), the Under Secretary shall use such methodologies as the Under Secretary considers are generally accepted by the weather enterprise, including social and behavioral sciences.

(c) IMPROVEMENTS TO SYSTEM.—

(1) IN GENERAL.—The Under Secretary shall, based on the assessment required by subsection (b)(1)(A), make such recommendations to Congress to improve the system as the Under Secretary considers necessary—

(A) to improve the system for issuing watches and warnings regarding hazardous weather and water events; and

(B) to support efforts to satisfy research needs to enable future improvements to such system.

(2) REQUIREMENTS REGARDING RECOMMENDATIONS.—In carrying out paragraph (1)(A), the Under Secretary shall ensure that any recommendation that the Under Secretary considers a major change—

(A) is validated by social and behavioral science using a generalizable sample;

(B) accounts for the needs of various demographics, vulnerable populations, and geographic regions;

(C) accounts for the differences between types of weather and water hazards;

(D) responds to the needs of Federal, State, and local government partners and media partners; and

(E) accounts for necessary changes to Federally operated watch and warning propagation and dissemination infrastructure and protocols.

(d) WATCHES AND WARNINGS DEFINED.—

(1) IN GENERAL.—Except as provided in paragraph (2), in this section, the terms "watch" and "warning", with respect to a hazardous weather and water event, mean products issued by the Administration, intended for consumption by the general public, to alert the general public to the potential for or presence of the event and to inform action to prevent loss of life and property.

(2) EXCEPTION.—ln this section, the terms "watch" and "warning" do not include technical or specialized meteorological and hydrological forecasts, outlooks, or model guidance products.

SEC. 407. [15 U.S.C. 8546] NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION WEATHER READY ALL HAZARDS AWARD PROGRAM.

(a) PROGRAM.—The Director of the National Weather Service is authorized to establish the National Oceanic and Atmospheric Administration Weather Ready All Hazards Award Program. This award program shall provide annual awards to honor individuals or organizations that use or provide National Oceanic and Atmospheric Administration Weather Radio All Hazards receivers or transmitters to save lives and protect property. Individuals or organizations that utilize other early warning tools or applications also qualify for this award.

(b) GOAL.—This award program draws attention to the life-saving work of the National Oceanic and Atmospheric Administration Weather Ready All Hazards Program, as well as emerging tools and applications, that provide real-time warning to individuals and communities of severe weather or other hazardous conditions.

(c) PROGRAM ELEMENTS.—

(1) NOMINATIONS.—Nominations for this award shall be made annually by the Weather Field Offices to the Director of the National Weather Service. Broadcast meteorologists, weather radio manufacturers and weather warning tool and application developers, emergency managers, and public safety officials may nominate individuals or organizations to their local Weather Field Offices, but the final list of award nominees must come from the Weather Field Offices.

(2) SELECTION OF AWARDEES.—Annually, the Director of the National Weather Service shall choose winners of this award whose timely actions, based on National Oceanic and Atmospheric Administration Weather Radio All Hazards receivers or transmitters or other early warning tools and applications, saved lives or property, or demonstrated public service in support of weather or all hazard warnings.

(3) AWARD CEREMONY.—The Director of the National Weather Service shall establish a means of making these awards to provide maximum public awareness of the importance of National Oceanic and Atmospheric Administration Weather Radio, and such other warning tools and applications as are represented in the awards.

SEC. 408. DEPARTMENT OF DEFENSE WEATHER FORECASTING ACTIVITIES.

Not later than 60 days after the date of the enactment of this Act, the Under Secretary shall submit to the Committee on Com-

merce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report analyzing the impacts of the proposed Air Force divestiture in the United States Weather Research and Forecasting Model, including—

(1) the impact on—

(A) the United States weather forecasting capabilities;

(B) the accuracy of civilian regional forecasts;

(C) the civilian readiness for traditional weather and extreme weather events in the United States; and

(D) the research necessary to develop the United States Weather Research and Forecasting Model; and

(2) such other analysis relating to the divestiture as the Under Secretary considers appropriate.

SEC. 409. NATIONAL WEATHER SERVICE; OPERATIONS AND WORKFORCE ANALYSIS.

The Under Secretary shall contract or continue to partner with an external organization to conduct a baseline analysis of National Weather Service operations and workforce.

SEC. 410. [15 U.S.C. 8547] REPORT ON CONTRACT POSITIONS AT NATIONAL WEATHER SERVICE.

(a) REPORT REQUIRED.—Not later than 180 days after the date of the enactment of this Act, the Under Secretary shall submit to Congress a report on the use of contractors at the National Weather Service for the most recently completed fiscal year.

(b) CONTENTS.—The report required by subsection (a) shall include, with respect to the most recently completed fiscal year, the following:

(1) The total number of full-time equivalent employees at the National Weather Service, disaggregated by each equivalent level of the General Schedule.

(2) The total number of full-time equivalent contractors at the National Weather Service, disaggregated by each equivalent level of the General Schedule that most closely approximates their duties.

(3) The total number of vacant positions at the National Weather Service on the day before the date of enactment of this Act, disaggregated by each equivalent level of the General Schedule.

(4) The five most common positions filled by full-time equivalent contractors at the National Weather Service and the equivalent level of the General Schedule that most closely approximates the duties of such positions.

(5) Of the positions identified under paragraph (4), the percentage of full-time equivalent contractors in those positions that have held a prior position at the National Weather Service or another entity in National Oceanic and Atmospheric Administration.

(6) The average full-time equivalent salary for Federal employees at the National Weather Service for each equivalent level of the General Schedule.

(7) The average salary for full-time equivalent contractors performing at each equivalent level of the General Schedule at the National Weather Service.

(8) A description of any actions taken by the Under Secretary to respond to the issues raised by the Inspector General of the Department of Commerce regarding the hiring of former National Oceanic and Atmospheric Administration employees as contractors at the National Weather Service such as the issues raised in the Investigative Report dated June 2, 2015 (OIG-12-0447).

(c) ANNUAL PUBLICATION.—For each fiscal year after the fiscal year covered by the report required by subsection (a), the Under Secretary shall, not later than 180 days after the completion of the fiscal year, publish on a publicly accessible Internet website the information described in paragraphs (1) through (8) of subsection (b) for such fiscal year.

SEC. 411. WEATHER IMPACTS TO COMMUNITIES AND INFRASTRUCTURE.

(a) REVIEW.—

(1) IN GENERAL.—The Director of the National Weather Service shall review existing research, products, and services that meet the specific needs of the urban environment, given its unique physical characteristics and forecasting challenges.

(2) ELEMENTS.—The review required by paragraph (1) shall include research, products, and services with the potential to improve modeling and forecasting capabilities, taking into account factors including varying building heights, impermeable surfaces, lack of tree canopy, traffic, pollution, and inter-building wind effects.

(b) REPORT AND ASSESSMENT.—Upon completion of the review required by subsection (a), the Under Secretary shall submit to Congress a report on the research, products, and services of the National Weather Service, including an assessment of such research, products, and services that is based on the review, public comment, and recent publications by the National Academy of Sciences.

SEC. 412. [15 U.S.C. 8548] WEATHER ENTERPRISE OUTREACH.

(a) IN GENERAL.—The Under Secretary may establish mechanisms for outreach to the weather enterprise—

(1) to assess the weather forecasts and forecast products provided by the National Oceanic and Atmospheric Administration; and

(2) to determine the highest priority weather forecast needs of the community described in subsection (b).

(b) OUTREACH COMMUNITY.—In conducting outreach under subsection (a), the Under Secretary shall contact leading experts and innovators from relevant stakeholders, including the representatives from the following:

(1) State or local emergency management agencies.

(2) State agriculture agencies.

(3) Indian tribes (as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 5304)) and Native Hawaiians (as defined in section 6207 of the Ele-

mentary and Secondary Education Act of 1965 (20 U.S.C. 7517)).

(4) The private aerospace industry.

(5) The private earth observing industry.

(6) The operational forecasting community.

(7) The academic community.

(8) Professional societies that focus on meteorology.

(9) Such other stakeholder groups as the Under Secretary considers appropriate.

SEC. 413. [15 U.S.C. 8549] HURRICANE HUNTER AIRCRAFT.

(a) BACKUP CAPABILITY.—The Under Secretary shall acquire backup for the capabilities of the WP-3D Orion and G-IV hurricane aircraft of the National Oceanic and Atmospheric Administration that is sufficient to prevent a single point of failure.

(b) AUTHORITY TO ENTER AGREEMENTS.—In order to carry out subsection (a), the Under Secretary shall negotiate and enter into 1 or more agreements or contracts, to the extent practicable and necessary, with governmental and non-governmental entities.

(c) FUTURE TECHNOLOGY.—The Under Secretary shall continue the development of Airborne Phased Array Radar under the United States Weather Research Program.

(d) AUTHORIZATION OF APPROPRIATIONS.—For each of fiscal years 2017 through 2020, support for implementing subsections (a) and (b) is authorized out of funds appropriated to the Office of Marine and Aviation Operations.

SEC. 414. STUDY ON GAPS IN NEXRAD COVERAGE AND RECOMMENDATIONS TO ADDRESS SUCH GAPS.

(a) STUDY ON GAPS IN NEXRAD COVERAGE.—

(1) IN GENERAL.—Not later than 180 days after the date of the enactment of this Act, the Secretary of Commerce shall complete a study on gaps in the coverage of the Next Generation Weather Radar of the National Weather Service ("NEXRAD").

(2) ELEMENTS.—In conducting the study required under paragraph (1), the Secretary shall—

(A) identify areas in the United States where limited or no NEXRAD coverage has resulted in—

(i) instances in which no or insufficient warnings were given for hazardous weather events, including tornadoes; or

(ii) degraded forecasts for hazardous weather events that resulted in fatalities, significant injuries, or substantial property damage; and

(B) for the areas identified under subparagraph (A)—

(i) identify the key weather effects for which prediction would improve with improved radar detection;

(ii) identify additional sources of observations for high impact weather that were available and operational for such areas on the day before the date of the enactment of this Act, including dense networks of x-band radars, Terminal Doppler Weather Radar (commonly known as "TDWR"), air surveillance radars of

the Federal Aviation Administration, and cooperative network observers;

(iii) assess the feasibility and advisability of efforts to integrate and upgrade Federal radar capabilities that are not owned or controlled by the National Oceanic and Atmospheric Administration, including radar capabilities of the Federal Aviation Administration and the Department of Defense;

(iv) assess the feasibility and advisability of incorporating State-operated and other non-Federal radars into the operations of the National Weather Service;

(v) identify options to improve hazardous weather detection and forecasting coverage; and

(vi) provide the estimated cost of, and timeline for, each of the options identified under clause (v).

(3) REPORT.—Upon the completion of the study required under paragraph (1), the Secretary shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that includes the findings of the Secretary with respect to the study.

(b) RECOMMENDATIONS TO IMPROVE RADAR COVERAGE.—Not later than 90 days after the completion of the study under subsection (a)(1), the Secretary of Commerce shall submit to the congressional committees referred to in subsection (a)(3) recommendations for improving hazardous weather detection and forecasting coverage in the areas identified under subsection (a)(2)(A) by integrating additional observation solutions to the extent practicable and meteorologically justified and necessary to protect public safety.

(c) THIRD-PARTY CONSULTATION REGARDING RECOMMENDATIONS TO IMPROVE RADAR COVERAGE.—The Secretary of Commerce may seek reviews by, or consult with, appropriate third parties regarding the scientific methodology relating to, and the feasibility and advisability of implementing, the recommendations submitted under subsection (b), including the extent to which warning and forecast services of the National Weather Service would be improved by additional observations.

TITLE V—TSUNAMI WARNING, EDUCATION, AND RESEARCH ACT OF 2017

SEC. 501. [33 U.S.C. 3201 note] SHORT TITLE.

This title may be cited as the "Tsunami Warning, Education, and Research Act of 2017".

SEC. 502. REFERENCES TO THE TSUNAMI WARNING AND EDUCATION ACT.

Except as otherwise expressly provided, whenever in this title an amendment or repeal is expressed in terms of an amendment to, or repeal of, a section or other provision, the reference shall be considered to be made to a section or other provision of the Tsunami Warning and Education Act enacted as title VIII of the Mag-

nuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109-479; 33 U.S.C. 3201 et seq.).

SEC. 503. EXPANSION OF PURPOSES OF TSUNAMI WARNING AND EDUCATION ACT.

Section 803 (33 U.S.C. 3202) is amended—

(1) in paragraph (1), by inserting "research," after "warnings,";

(2) by amending paragraph (2) to read as follows:

"(2) to enhance and modernize the existing United States Tsunami Warning System to increase the accuracy of forecasts and warnings, to ensure full coverage of tsunami threats to the United States with a network of detection assets, and to reduce false alarms;";

(3) by amending paragraph (3) to read as follows:

"(3) to improve and develop standards and guidelines for mapping, modeling, and assessment efforts to improve tsunami detection, forecasting, warnings, notification, mitigation, resiliency, response, outreach, and recovery;";

(4) by redesignating paragraphs (4), (5), and (6) as paragraphs (5), (6), and (8), respectively;

(5) by inserting after paragraph (3) the following:

"(4) to improve research efforts related to improving tsunami detection, forecasting, warnings, notification, mitigation, resiliency, response, outreach, and recovery;";

(6) in paragraph (5), as redesignated—

(A) by striking "and increase" and inserting ", increase, and develop uniform standards and guidelines for"; and

(B) by inserting ", including the warning signs of locally generated tsunami" after "approaching";

(7) in paragraph (6), as redesignated, by striking ", including the Indian Ocean; and" and inserting a semicolon; and

(8) by inserting after paragraph (6), as redesignated, the following:

"(7) to foster resilient communities in the face of tsunami and other similar coastal hazards; and".

SEC. 504. MODIFICATION OF TSUNAMI FORECASTING AND WARNING PROGRAM.

(a) IN GENERAL.—Subsection (a) of section 804 (33 U.S.C. 3203(a)) is amended by striking "Atlantic Ocean, Caribbean Sea, and Gulf of Mexico region" and inserting "Atlantic Ocean region, including the Caribbean Sea and the Gulf of Mexico".

(b) COMPONENTS.—Subsection (b) of section 804 (33 U.S.C. 3203(b)) is amended—

(1) in paragraph (1), by striking "established" and inserting "supported or maintained";

(2) by redesignating paragraphs (7) through (9) as paragraphs (8) through (10), respectively;

(3) by redesignating paragraphs (2) through (6) as paragraphs (3) through (7), respectively;

(4) by inserting after paragraph (1) the following:

"(2) to the degree practicable, maintain not less than 80 percent of the Deep-ocean Assessment and Reporting of

Tsunamis buoy array at operational capacity to optimize data reliability;".

(5) by amending paragraph (5), as redesignated by paragraph (3), to read as follows:

"(5) provide tsunami forecasting capability based on models and measurements, including tsunami inundation models and maps for use in increasing the preparedness of communities and safeguarding port and harbor operations, that incorporate inputs, including—

"(A) the United States and global ocean and coastal observing system;

"(B) the global Earth observing system;

"(C) the global seismic network;

"(D) the Advanced National Seismic system;

"(E) tsunami model validation using historical and paleotsunami data;

"(F) digital elevation models and bathymetry; and

"(G) newly developing tsunami detection methodologies using satellites and airborne remote sensing;";

(6) by amending paragraph (7), as redesignated by paragraph (3), to read as follows:

"(7) include a cooperative effort among the Administration, the United States Geological Survey, and the National Science Foundation under which the Director of the United States Geological Survey and the Director of the National Science Foundation shall—

"(A) provide rapid and reliable seismic information to the Administrator from international and domestic seismic networks; and

"(B) support seismic stations installed before the date of the enactment of the Tsunami Warning, Education, and Research Act of 2017 to supplement coverage in areas of sparse instrumentation;";

(7) in paragraph (8), as redesignated by paragraph (2)—

(A) by inserting ", including graphical warning products," after "warnings";

(B) by inserting ", territories," after "States"; and

(C) by inserting "and Wireless Emergency Alerts" after "Hazards Program"; and

(8) in paragraph (9), as redesignated by paragraph (2)—

(A) by inserting "provide and" before "allow"; and

(B) by inserting "and commercial and Federal undersea communications cables" after "observing technologies".

(c) TSUNAMI WARNING SYSTEM.—Subsection (c) of section 804 (33 U.S.C. 3203(c)) is amended to read as follows:

"(c) TSUNAMI WARNING SYSTEM.—The program under this section shall operate a tsunami warning system that—

"(1) is capable of forecasting tsunami, including forecasting tsunami arrival time and inundation estimates, anywhere in the Pacific and Arctic Ocean regions and providing adequate warnings;

"(2) is capable of forecasting and providing adequate warnings, including tsunami arrival time and inundation models

where applicable, in areas of the Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico, that are determined—

"(A) to be geologically active, or to have significant potential for geological activity; and

"(B) to pose significant risks of tsunami for States along the coastal areas of the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico; and

"(3) supports other international tsunami forecasting and warning efforts.".

(d) TSUNAMI WARNING CENTERS.—Subsection (d) of section 804 (33 U.S.C. 3203(d)) is amended to read as follows:

"(d) TSUNAMI WARNING CENTERS.—

"(1) IN GENERAL.—The Administrator shall support or maintain centers to support the tsunami warning system required by subsection (c). The Centers shall include—

"(A) the National Tsunami Warning Center, located in Alaska, which is primarily responsible for Alaska and the continental United States;

"(B) the Pacific Tsunami Warning Center, located in Hawaii, which is primarily responsible for Hawaii, the Caribbean, and other areas of the Pacific not covered by the National Center; and

"(C) any additional forecast and warning centers determined by the National Weather Service to be necessary.

"(2) RESPONSIBILITIES.—The responsibilities of the centers supported or maintained under paragraph (1) shall include the following:

"(A) Continuously monitoring data from seismological, deep ocean, coastal sea level, and tidal monitoring stations and other data sources as may be developed and deployed.

"(B) Evaluating earthquakes, landslides, and volcanic eruptions that have the potential to generate tsunami.

"(C) Evaluating deep ocean buoy data and tidal monitoring stations for indications of tsunami resulting from earthquakes and other sources.

"(D) To the extent practicable, utilizing a range of models, including ensemble models, to predict tsunami, including arrival times, flooding estimates, coastal and harbor currents, and duration.

"(E) Using data from the Integrated Ocean Observing System of the Administration in coordination with regional associations to calculate new inundation estimates and periodically update existing inundation estimates.

"(F) Disseminating forecasts and tsunami warning bulletins to Federal, State, tribal, and local government officials and the public.

"(G) Coordinating with the tsunami hazard mitigation program conducted under section 805 to ensure ongoing sharing of information between forecasters and emergency management officials.

"(H) In coordination with the Commandant of the Coast Guard and the Administrator of the Federal Emergency Management Agency, evaluating and recommending procedures for ports and harbors at risk of tsunami inun-

dation, including review of readiness, response, and communication strategies, and data sharing policies, to the maximum extent practicable.

"(I) Making data gathered under this Act and post-warning analyses conducted by the National Weather Service or other relevant Administration offices available to the public.

"(J) Integrating and modernizing the program operated under this section with advances in tsunami science to improve performance without compromising service.

"(3) FAIL-SAFE WARNING CAPABILITY.—The tsunami warning centers supported or maintained under paragraph (1) shall maintain a fail-safe warning capability and perform back-up duties for each other.

"(4) COORDINATION WITH NATIONAL WEATHER SERVICE.—The Administrator shall coordinate with the forecast offices of the National Weather Service, the centers supported or maintained under paragraph (1), and such program offices of the Administration as the Administrator or the coordinating committee, as established in section 805(d), consider appropriate to ensure that regional and local forecast offices—

"(A) have the technical knowledge and capability to disseminate tsunami warnings for the communities they serve;

"(B) leverage connections with local emergency management officials for optimally disseminating tsunami warnings and forecasts; and

"(C) implement mass communication tools in effect on the day before the date of the enactment of the Tsunami Warning, Education, and Research Act of 2017 used by the National Weather Service on such date and newer mass communication technologies as they are developed as a part of the Weather-Ready Nation program of the Administration, or otherwise, for the purpose of timely and effective delivery of tsunami warnings.

"(5) UNIFORM OPERATING PROCEDURES.—The Administrator shall—

"(A) develop uniform operational procedures for the centers supported or maintained under paragraph (1), including the use of software applications, checklists, decision support tools, and tsunami warning products that have been standardized across the program supported under this section;

"(B) ensure that processes and products of the warning system operated under subsection (c)—

"(i) reflect industry best practices when practicable;

"(ii) conform to the maximum extent practicable with internationally recognized standards for information technology; and

"(iii) conform to the maximum extent practicable with other warning products and practices of the National Weather Service;

"(C) ensure that future adjustments to operational protocols, processes, and warning products—

"(i) are made consistently across the warning system operated under subsection (c); and

"(ii) are applied in a uniform manner across such warning system;

"(D) establish a systematic method for information technology product development to improve long-term technology planning efforts; and

"(E) disseminate guidelines and metrics for evaluating and improving tsunami forecast models.

"(6) AVAILABLE RESOURCES.—The Administrator, through the National Weather Service, shall ensure that resources are available to fulfill the obligations of this Act. This includes ensuring supercomputing resources are available to run, as rapidly as possible, such computer models as are needed for purposes of the tsunami warning system operated under subsection (c).".

(e) TRANSFER OF TECHNOLOGY; MAINTENANCE AND UPGRADES.—Subsection (e) of section 804 (33 U.S.C. 3203(e)) is amended to read as follows:

"(e) TRANSFER OF TECHNOLOGY; MAINTENANCE AND UPGRADES.—In carrying out this section, the Administrator shall—

"(1) develop requirements for the equipment used to forecast tsunami, including—

"(A) provisions for multipurpose detection platforms;

"(B) reliability and performance metrics; and

"(C) to the maximum extent practicable, requirements for the integration of equipment with other United States and global ocean and coastal observation systems, the global Earth observing system of systems, the global seismic networks, and the Advanced National Seismic System;

"(2) develop and execute a plan for the transfer of technology from ongoing research conducted as part of the program supported or maintained under section 6 into the program under this section; and

"(3) ensure that the Administration's operational tsunami detection equipment is properly maintained.".

(f) FEDERAL COOPERATION.—Subsection (f) of section 804 (33 U.S.C. 3203(f)) is amended to read as follows:

"(f) FEDERAL COOPERATION.—When deploying and maintaining tsunami detection technologies under the program under this section, the Administrator shall—

"(1) identify which assets of other Federal agencies are necessary to support such program; and

"(2) work with each agency identified under paragraph (1)—

"(A) to acquire the agency's assistance; and

"(B) to prioritize the necessary assets in support of the tsunami forecast and warning program.".

(g) UNNECESSARY PROVISIONS.—Section 804 (33 U.S.C. 3203) is further amended—

(1) by striking subsection (g);

(2) by striking subsections (i) through (k); and

(3) by redesignating subsection (h) as subsection (g).

(h) CONGRESSIONAL NOTIFICATIONS.—Subsection (g) of section 804 (33 U.S.C. 3203(g)), as redesignated by subsection (g)(3), is amended—

(1) by redesignating paragraphs (1) and (2) as subparagraphs (A) and (B), respectively, and moving such subparagraphs 2 ems to the right;

(2) in the matter before subparagraph (A), as redesignated by paragraph (2), by striking "The Administrator" and inserting the following:

"(1) IN GENERAL.—The Administrator";

(3) in paragraph (1), as redesignated by paragraph (3)—

(A) in subparagraph (A), as redesignated by paragraph (2), by striking "and" at the end;

(B) in subparagraph (B), as redesignated by paragraph (2), by striking the period at the end and inserting "; and"; and

(C) by adding at the end the following:

"(C) the occurrence of a significant tsunami warning."; and

(4) by adding at the end the following:

"(2) CONTENTS.—In a case in which notice is submitted under paragraph (1) within 30 days of a significant tsunami warning described in subparagraph (C) of such paragraph, such notice shall include, as appropriate, brief information and analysis of—

"(A) the accuracy of the tsunami model used;

"(B) the specific deep ocean or other monitoring equipment that detected the incident, as well as the deep ocean or other monitoring equipment that did not detect the incident due to malfunction or other reasons;

"(C) the effectiveness of the warning communication, including the dissemination of warnings with State, territory, local, and tribal partners in the affected area under the jurisdiction of the National Weather Service; and

"(D) such other findings as the Administrator considers appropriate.".

SEC. 505. MODIFICATION OF NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM.

(a) IN GENERAL.—Section 805(a) (33 U.S.C. 3204(a)) is amended to read as follows:

"(a) PROGRAM REQUIRED.—The Administrator, in coordination with the Administrator of the Federal Emergency Management Agency and the heads of such other agencies as the Administrator considers relevant, shall conduct a community-based tsunami hazard mitigation program to improve tsunami preparedness and resiliency of at-risk areas in the United States and the territories of the United States.".

(b) NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM.—Section 805 (33 U.S.C. 3204) is amended by striking subsections (c) and (d) and inserting the following:

"(c) PROGRAM COMPONENTS.—The Program conducted under subsection (a) shall include the following:

"(1) Technical and financial assistance to coastal States, territories, tribes, and local governments to develop and implement activities under this section.

"(2) Integration of tsunami preparedness and mitigation programs into ongoing State-based hazard warning, resilience planning, and risk management activities, including predisaster planning, emergency response, evacuation planning, disaster recovery, hazard mitigation, and community development and redevelopment planning programs in affected areas.

"(3) Coordination with other Federal preparedness and mitigation programs to leverage Federal investment, avoid duplication, and maximize effort.

"(4) Activities to promote the adoption of tsunami resilience, preparedness, warning, and mitigation measures by Federal, State, territorial, tribal, and local governments and nongovernmental entities, including educational and risk communication programs to discourage development in high-risk areas.

"(5) Activities to support the development of regional tsunami hazard and risk assessments. Such regional risk assessments may include the following:

"(A) The sources, sizes, and other relevant historical data of tsunami in the region, including paleotsunami data.

"(B) Inundation models and maps of critical infrastructure and socioeconomic vulnerability in areas subject to tsunami inundation.

"(C) Maps of evacuation areas and evacuation routes, including, when appropriate, traffic studies that evaluate the viability of evacuation routes.

"(D) Evaluations of the size of populations that will require evacuation, including populations with special evacuation needs.

"(E) Evaluations and technical assistance for vertical evacuation structure planning for communities where models indicate limited or no ability for timely evacuation, especially in areas at risk of near shore generated tsunami.

"(F) Evaluation of at-risk ports and harbors.

"(G) Evaluation of the effect of tsunami currents on the foundations of closely-spaced, coastal high-rise structures.

"(6) Activities to promote preparedness in at-risk ports and harbors, including the following:

"(A) Evaluation and recommendation of procedures for ports and harbors in the event of a distant or near-field tsunami.

"(B) A review of readiness, response, and communication strategies to ensure coordination and data sharing with the Coast Guard.

"(7) Activities to support the development of community-based outreach and education programs to ensure community readiness and resilience, including the following:

"(A) The development, implementation, and assessment of technical training and public education programs, including education programs that address unique characteristics of distant and near-field tsunami.

"(B) The development of decision support tools.

"(C) The incorporation of social science research into community readiness and resilience efforts.

"(D) The development of evidence-based education guidelines.

"(8) Dissemination of guidelines and standards for community planning, education, and training products, programs, and tools, including—

"(A) standards for—

"(i) mapping products;

"(ii) inundation models; and

"(iii) effective emergency exercises; and

"(B) recommended guidance for at-risk port and harbor tsunami warning, evacuation, and response procedures in coordination with the Coast Guard and the Federal Emergency Management Agency.

"(d) AUTHORIZED ACTIVITIES.—In addition to activities conducted under subsection (c), the program conducted under subsection (a) may include the following:

"(1) Multidisciplinary vulnerability assessment research, education, and training to help integrate risk management and resilience objectives with community development planning and policies.

"(2) Risk management training for local officials and community organizations to enhance understanding and preparedness.

"(3) In coordination with the Federal Emergency Management Agency, interagency, Federal, State, tribal, and territorial intergovernmental tsunami response exercise planning and implementation in high risk areas.

"(4) Development of practical applications for existing or emerging technologies, such as modeling, remote sensing, geospatial technology, engineering, and observing systems, including the integration of tsunami sensors into Federal and commercial submarine telecommunication cables if practicable.

"(5) Risk management, risk assessment, and resilience data and information services, including—

"(A) access to data and products derived from observing and detection systems; and

"(B) development and maintenance of new integrated data products to support risk management, risk assessment, and resilience programs.

"(6) Risk notification systems that coordinate with and build upon existing systems and actively engage decisionmakers, State, local, tribal, and territorial governments and agencies, business communities, nongovernmental organizations, and the media.

"(e) NO PREEMPTION WITH RESPECT TO DESIGNATION OF AT-RISK AREAS.—The establishment of national standards for inundation models under this section shall not prevent States, territories,

tribes, and local governments from designating additional areas as being at risk based on knowledge of local conditions.

"(f) NO NEW REGULATORY AUTHORITY.—Nothing in this Act may be construed as establishing new regulatory authority for any Federal agency.".

(c) REPORT ON ACCREDITATION OF TSUNAMIREADY PROGRAM.—Not later than 180 days after the date of enactment of this Act, the Administrator of the National Oceanic and Atmospheric Administration shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report on which authorities and activities would be needed to have the TsunamiReady program of the National Weather Service accredited by the Emergency Management Accreditation Program.

SEC. 506. MODIFICATION OF TSUNAMI RESEARCH PROGRAM.

Section 806 (33 U.S.C. 3205) is amended—

(1) in the matter before paragraph (1), by striking "The Administrator shall" and all that follows through "establish or maintain" and inserting the following:

"(a) IN GENERAL.—The Administrator shall, in consultation with such other Federal agencies, State, tribal, and territorial governments, and academic institutions as the Administrator considers appropriate, the coordinating committee under section 805(d), and the panel under section 808(a), support or maintain";

(2) in subsection (a), as designated by paragraph (1), by striking "and assessment for tsunami tracking and numerical forecast modeling. Such research program shall—" and inserting the following:" assessment for tsunami tracking and numerical forecast modeling, and standards development.

"(b) RESPONSIBILITIES.—The research program supported or maintained under subsection (a) shall—"; and

(3) in subsection (b), as designated by paragraph (2)—

(A) by amending paragraph (1) to read as follows:

"(1) consider other appropriate and cost effective solutions to mitigate the impact of tsunami, including the improvement of near-field and distant tsunami detection and forecasting capabilities, which may include use of a new generation of the Deep-ocean Assessment and Reporting of Tsunamis array, integration of tsunami sensors into commercial and Federal telecommunications cables, and other real-time tsunami monitoring systems and supercomputer capacity of the Administration to develop a rapid tsunami forecast for all United States coastlines;";

(B) in paragraph (3)—

(i) by striking "include" and inserting "conduct"; and

(ii) by striking "and" at the end;

(C) by redesignating paragraph (4) as paragraph (5);

(D) by inserting after paragraph (3) the following:

"(4) develop the technical basis for validation of tsunami maps, numerical tsunami models, digital elevation models, and forecasts; and"; and

(E) in paragraph (5), as redesignated by subparagraph (C), by striking "to the scientific community" and inserting "to the public and the scientific community".

SEC. 507. GLOBAL TSUNAMI WARNING AND MITIGATION NETWORK.

Section 807 (33 U.S.C. 3206) is amended—

(1) by amending subsection (a) to read as follows:

"(a) SUPPORT FOR DEVELOPMENT OF AN INTERNATIONAL TSUNAMI WARNING SYSTEM.—The Administrator shall, in coordination with the Secretary of State and in consultation with such other agencies as the Administrator considers relevant, provide technical assistance, operational support, and training to the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific, and Cultural Organization, the World Meteorological Organization of the United Nations, and such other international entities as the Administrator considers appropriate, as part of the international efforts to develop a fully functional global tsunami forecast and warning system comprised of regional tsunami warning networks.";

(2) in subsection (b), by striking "shall" each place it appears and inserting "may"; and

(3) in subsection (c)—

(A) in paragraph (1), by striking "establishing" and inserting "supporting"; and

(B) in paragraph (2)—

(i) by striking "establish" and inserting "support"; and

(ii) by striking "establishing" and inserting "supporting".

SEC. 508. TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY PANEL.

(a) IN GENERAL.—The Act is further amended—

(1) by redesignating section 808 (33 U.S.C. 3207) as section 809; and

(2) by inserting after section 807 (33 U.S.C. 3206) the following:

"SEC. 808. [33 U.S.C. 3206a] TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY PANEL

"(a) DESIGNATION.—The Administrator shall designate an existing working group within the Science Advisory Board of the Administration to serve as the Tsunami Science and Technology Advisory Panel to provide advice to the Administrator on matters regarding tsunami science, technology, and regional preparedness.

"(b) MEMBERSHIP.—

"(1) COMPOSITION.—The Panel shall be composed of no fewer than 7 members selected by the Administrator from among individuals from academia or State agencies who have academic or practical expertise in physical sciences, social sciences, information technology, coastal resilience, emergency management, or such other disciplines as the Administrator considers appropriate.

"(2) FEDERAL EMPLOYMENT.—No member of the Panel may be a Federal employee.

"(c) RESPONSIBILITIES.—Not less frequently than once every 4 years, the Panel shall—

"(1) review the activities of the Administration, and other Federal activities as appropriate, relating to tsunami research, detection, forecasting, warning, mitigation, resiliency, and preparation; and

"(2) submit to the Administrator and such others as the Administrator considers appropriate—

"(A) the findings of the working group with respect to the most recent review conducted under paragraph (1); and

"(B) such recommendations for legislative or administrative action as the working group considers appropriate to improve Federal tsunami research, detection, forecasting, warning, mitigation, resiliency, and preparation.

"(d) REPORTS TO CONGRESS.—Not less frequently than once every 4 years, the Administrator shall submit to the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science, Space, and Technology of the House of Representatives a report on the findings and recommendations received by the Administrator under subsection (c)(2).".

(b) TABLE OF CONTENTS AMENDMENT.—The table of contents in section 1(b) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109-479; 120 Stat. 3575) is amended by striking the item relating to section 808 and inserting the following:

"Sec. 808. Tsunami Science and Technology Advisory Panel.
"Sec. 809. Authorization of appropriations.".

SEC. 509. REPORTS.

(a) REPORT ON IMPLEMENTATION OF TSUNAMI WARNING AND EDUCATION ACT.—

(1) IN GENERAL.—Not later than 1 year after the date of the enactment of this Act, the Administrator of the National Oceanic and Atmospheric Administration shall submit to Congress a report on the implementation of the Tsunami Warning and Education Act enacted as title VIII of the Magnuson- Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109-479; 33 U.S.C. 3201 et seq.), as amended by this Act.

(2) ELEMENTS.—The report required by paragraph (1) shall include the following:

(A) A detailed description of the progress made in implementing sections 804(d)(6), 805(b), and 806(b)(4) of the Tsunami Warning and Education Act the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109-479; 33 U.S.C. 3201 et seq.).

(B) A description of the ways that tsunami warnings and warning products issued by the Tsunami Forecasting and Warning Program established under section 804 of the Tsunami Warning and Education Act (33 U.S.C. 3203), as amended by this Act, may be standardized and streamlined with warnings and warning products for hurricanes, coastal storms, and other coastal flooding events.

(b) REPORT ON NATIONAL EFFORTS THAT SUPPORT RAPID RESPONSE FOLLOWING NEAR-SHORE TSUNAMI EVENTS.—

(1) IN GENERAL.—Not later than 1 year after the date of the enactment of this Act, the Administrator and the Secretary of Homeland Security shall jointly, in coordination with the Director of the United States Geological Survey, Administrator of the Federal Emergency Management Agency, the Chief of the National Guard Bureau, and the heads of such other Federal agencies as the Administrator considers appropriate, submit to the appropriate committees of Congress a report on the national efforts in effect on the day before the date of the enactment of this Act that support and facilitate rapid emergency response following a domestic near-shore tsunami event to better understand domestic effects of earthquake derived tsunami on people, infrastructure, and communities in the United States.

(2) ELEMENTS.—The report required by paragraph (1) shall include the following:

(A) A description of scientific or other measurements collected on the day before the date of the enactment of this Act to quickly identify and quantify lost or degraded infrastructure or terrestrial formations.

(B) A description of scientific or other measurements that would be necessary to collect to quickly identify and quantify lost or degraded infrastructure or terrestrial formations.

(C) Identification and evaluation of Federal, State, local, tribal, territorial, and military first responder and search and rescue operation centers, bases, and other facilities as well as other critical response assets and infrastructure, including search and rescue aircraft, located within near-shore and distant tsunami inundation areas on the day before the date of the enactment of this Act.

(D) An evaluation of near-shore tsunami response plans in areas described in subparagraph (C) in effect on the day before the date of the enactment of this Act, and how those response plans would be affected by the loss of search and rescue and first responder infrastructure described in such subparagraph.

(E) A description of redevelopment plans and reports in effect on the day before the date of the enactment of this Act for communities in areas that are at high-risk for near-shore tsunami, as well identification of States or communities that do not have redevelopment plans.

(F) Recommendations to enhance near-shore tsunami preparedness and response plans, including recommended responder exercises, predisaster planning, and mitigation needs.

(G) Such other data and analysis information as the Administrator and the Secretary of Homeland Security consider appropriate.

(3) APPROPRIATE COMMITTEES OF CONGRESS.—In this subsection, the term "appropriate committees of Congress" means—

(A) the Committee on Commerce, Science, and Transportation and the Committee on Homeland Security and Governmental Affairs of the Senate; and

(B) the Committee on Science, Space, and Technology, the Committee on Homeland Security, and the Committee on Transportation and Infrastructure of the House of Representatives.

SEC. 510. AUTHORIZATION OF APPROPRIATIONS.

Section 809 of the Act, as redesignated by section —08(a)(1) of this Act, is amended—

(1) in paragraph (4)(B), by striking "and" at the end;

(2) in paragraph (5)(B), by striking the period at the end and inserting "; and"; and

(3) by adding at the end the following:

"(6) $25,800,000 for each of fiscal years 2016 through 2021, of which—

"(A) not less than 27 percent of the amount appropriated for each fiscal year shall be for activities conducted at the State level under the tsunami hazard mitigation program under section 805; and

"(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 806.".

SEC. 511. [33 U.S.C. 3208] OUTREACH RESPONSIBILITIES.

The Administrator of the National Oceanic and Atmospheric Administration, in coordination with State and local emergency managers, shall develop and carry out formal outreach activities to improve tsunami education and awareness and foster the development of resilient communities. Outreach activities may include—

(1) the development of outreach plans to ensure the close integration of tsunami warning centers supported or maintained under section 804(d) of the Tsunami Warning and Education Act (33 U.S.C. 3203(d)), as amended by this Act, with local Weather Forecast Offices of the National Weather Service and emergency managers;

(2) working with appropriate local Weather Forecast Offices to ensure they have the technical knowledge and capability to disseminate tsunami warnings to the communities they serve; and

(3) evaluating the effectiveness of warnings and of coordination with local Weather Forecast Offices after significant tsunami events.

SEC. 512. REPEAL OF DUPLICATE PROVISIONS OF LAW.

(a) [33 U.S.C. 3201] REPEAL.—The Tsunami Warning and Education Act enacted by Public Law 109-424 (120 Stat. 2902) is repealed.

(b) [33 U.S.C. 3201 note] CONSTRUCTION.—Nothing in this section may be construed to repeal, or affect in any way, the Tsunami Warning and Education Act enacted as title VIII of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109-479; 33 U.S.C. 3201 et seq.).

TITLE VI—IMPROVING FEDERAL PRECIPITATION INFORMATION

SEC. 601. [15 U.S.C. 8561] STUDY ON PRECIPITATION ESTIMATION.

(a) IN GENERAL.—Not later than 90 days after the date of enactment of the PRECIP Act, the Administrator, in consultation with other Federal agencies as appropriate, shall seek to enter an agreement with the National Academies—

(1) to conduct a study on the state of practice and research needs for precipitation estimation, including probable maximum precipitation estimation; and

(2) to submit, not later than 24 months after the date on which such agreement is finalized, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, and make publicly available on a website, a report on the results of the study under paragraph (1).

(b) STUDY.—The report under subsection (a) shall include the following:

(1) An examination of the current state of practice for precipitation estimation at scales appropriate for decisionmaker needs, and rationale for further evolution of this field.

(2) An evaluation of best practices for precipitation estimation that are based on the best-available science, include considerations of non-stationarity, and can be utilized by the user community.

(3) A framework for—

(A) the development of a National Guidance Document for estimating extreme precipitation in future conditions; and

(B) evaluation of the strengths and challenges of the full spectrum of approaches, including for probable maximum precipitation studies.

(4) A description of existing research needs in the field of precipitation estimation in order to modernize current methodologies and consider non-stationarity.

(5) A description of in-situ, airborne, and space-based observation requirements, that could enhance precipitation estimation and development of models, including an examination of the use of geographic information systems and geospatial technology for integration, analysis, and visualization of precipitation data.

(6) A recommended plan for a Federal research and development program, including specifications for costs, timeframes, and responsible agencies for addressing identified research needs.

(7) An analysis of the respective roles in precipitation estimation of various Federal agencies, academia, State, tribal, territorial, and local governments, and other public and private stakeholders.

(8) Recommendations for data management to promote long-term needs such as enabling retrospective analyses and data discoverability, interoperability, and reuse.

(9) Recommendations for how data and services from the entire enterprise can be best leveraged by the Federal Government.

(10) A description of non-Federal precipitation data, its accessibility by the Federal Government, and ways for National Oceanic and Atmospheric Administration to improve or expand such datasets.

(c) AUTHORIZATION OF APPROPRIATIONS.—There is authorized $1,500,000 to the National Oceanic and Atmospheric Administration to carry out this study.

SEC. 602. [15 U.S.C. 8562] IMPROVING PROBABLE MAXIMUM PRECIPITATION ESTIMATES.

(a) IN GENERAL.—Not later than 90 days after the date on which the National Academies makes public the report under section 601, the Administrator, in consideration of the report recommendations, shall consult with relevant partners, including users of the data, on the development of a plan to—

(1) not later than 6 years after the completion of such report and not less than every 10 years thereafter, update probable maximum precipitation estimates for the United States, such that each update considers non-stationarity;

(2) coordinate with partners to conduct research in the field of extreme precipitation estimation, in accordance with the research needs identified in such report;

(3) make publicly available, in a searchable, interoperable format, all probable maximum precipitation studies developed by the National Oceanic and Atmospheric Administration that the Administrator has the legal right to redistribute and deemed to be at an appropriate state of development on an internet website of the National Oceanic and Atmospheric Administration; and

(4) ensure all probable maximum precipitation estimate data, products, and supporting documentation and metadata developed by the National Oceanic and Atmospheric Administration are preserved, curated, and served by the National Oceanic and Atmospheric Administration, as appropriate.

(b) NATIONAL GUIDANCE DOCUMENT FOR THE DEVELOPMENT OF PROBABLE MAXIMUM PRECIPITATION ESTIMATES.—The Administrator, in collaboration with Federal agencies, State, territorial, Tribal and local governments, academia, and other partners the Administrator deems appropriate, shall develop a National Guidance Document that—

(1) provides best practices that can be followed by Federal and State regulatory agencies, private meteorological consultants, and other users that perform probable maximum precipitation studies;

(2) considers the recommendations provided in the National Academies study under section 601;

(3) facilitates review of probable maximum precipitation studies by regulatory agencies; and

(4) provides confidence in regional and site-specific probable maximum precipitation estimates.

(c) PUBLICATION.—Not later than 2 years after the date on which the National Academies makes public the report under sec-

tion 601, the Administrator shall make publicly available the National Guidance Document under subsection (b) on an internet website of the National Oceanic and Atmospheric Administration.

(d) UPDATES.—The Administrator shall update the National Guidance Document not less than once every 10 years after the publication of the National Guidance Document under subsection (c) and publish such updates in accordance with such subsection.

SEC. 603. [15 U.S.C. 8563] DEFINITIONS.

In this title:

(1) ADMINISTRATOR.—The term "Administrator" means the Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration.

(2) NATIONAL ACADEMIES.—The term "National Academies" means the National Academies of Sciences, Engineering, and Medicine.

(3) UNITED STATES.—The term "United States" means, collectively, each State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, the Virgin Islands of the United States, and any other territory or possession of the United States.